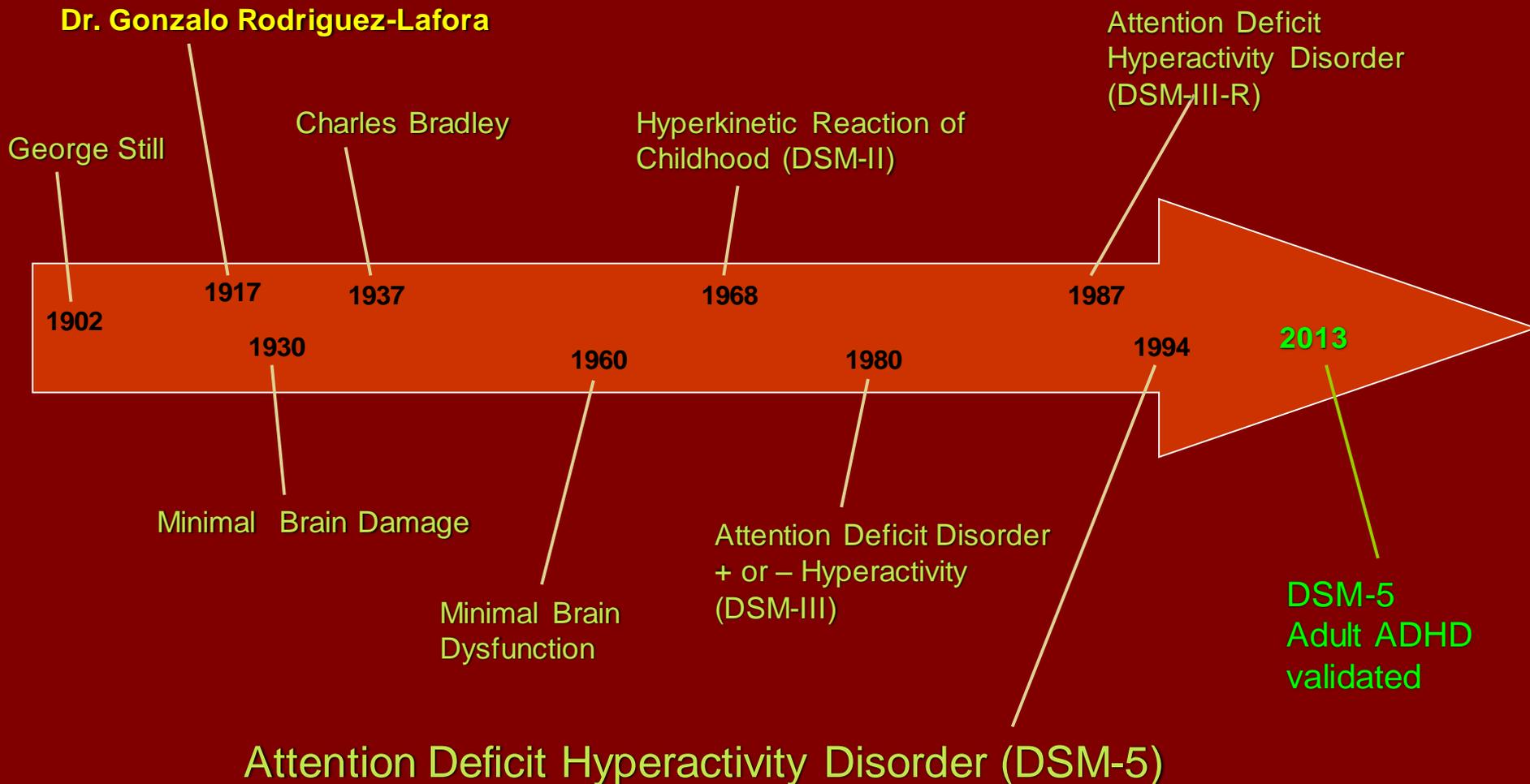


ADHD Historical Timeline



A Spanish Milestone in ADHD History

Dr. Gonzalo Rodriguez-Lafora, an influential physician in Spanish neuropsychiatry and psychology in his 1917 book Los Ninos Mentalmente Anormales reported on:

“Children that cannot sustain their attention even to hear or to understand or to respond. Their spirit consistently jumps from one thing to another. They cannot control their reactions. These are the children named as nervous by their parents and undisciplined by their teachers. They spontaneously get up from their desk, play with everything, get distracted even by a moving fly, pinch their classmates, make fun of everything and are in constant activity.”

National Library Madrid, Spain

“To see a single daily dose of benzedrine produce a greater improvement in school performance than the combined efforts of a capable staff working in a most favorable setting, would have been all but demoralizing to the teachers, had not the improvement been so gratifying from a practical viewpoint.”



I in 25 adults worldwide have ADHD

EPIDEMIOLOGY

ADHD Longitudinal Course

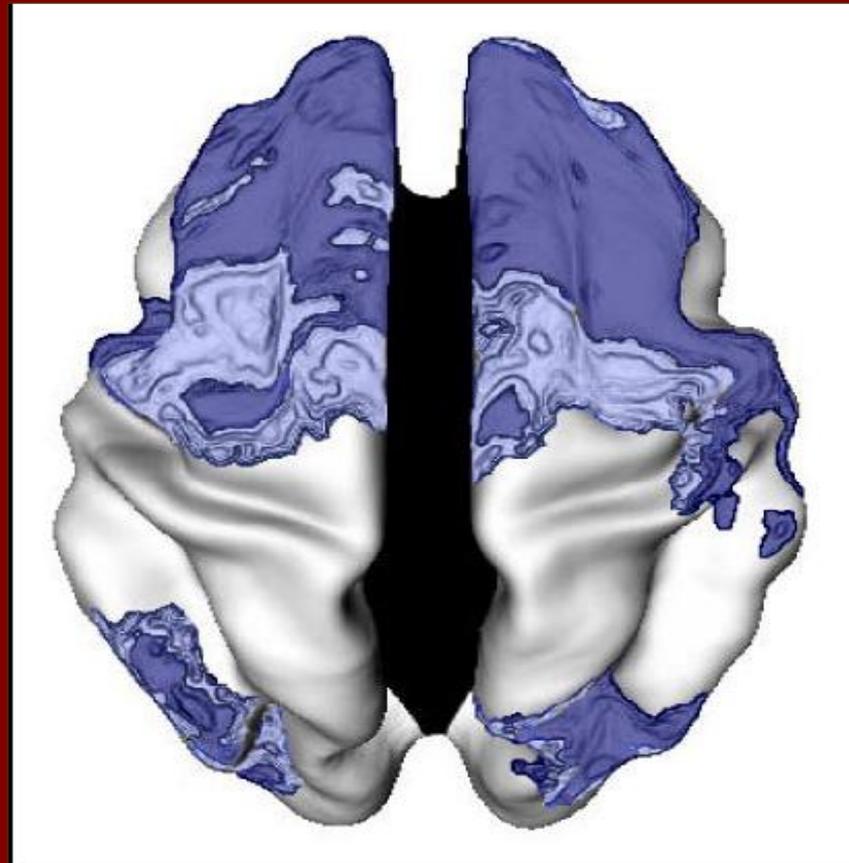
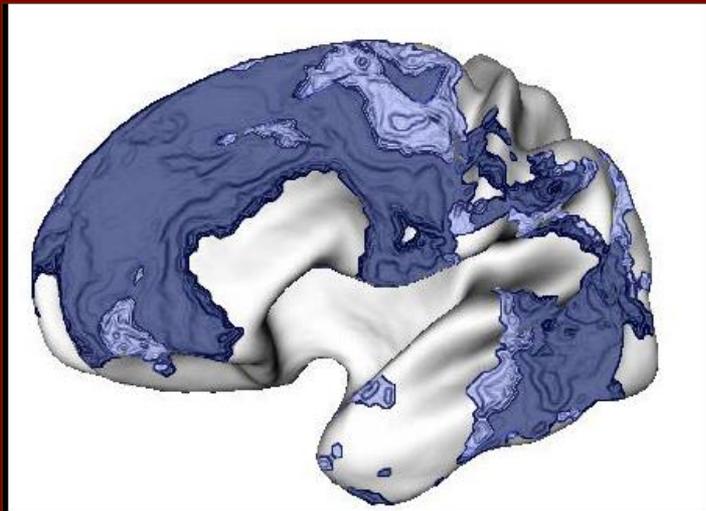
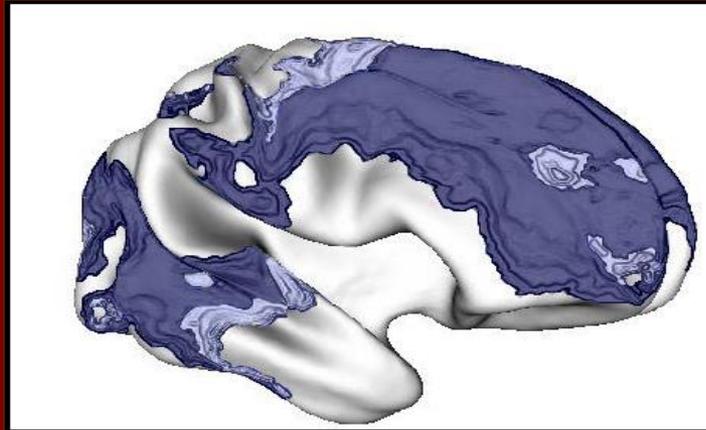
- 6–9% lifetime rate of ADHD in children
- 70% persistence of ADHD into adolescence
- 10-60% persistence of ADHD into adulthood
- Current population estimates of 4.4% rate of ADHD in adults¹
- Childhood ratio ADHD males to females - 2:1²
- Adult ratio ADHD, males to females – 1:1²

(Wender et.al. 2001)

¹Kessler RC, Adler L, Barkley R, et al., The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey Replication, American Journal of Psychiatry, April 2006

² DSM-5, APA, 2013

Delayed Brain Growth In ADHD (3 Yrs.)

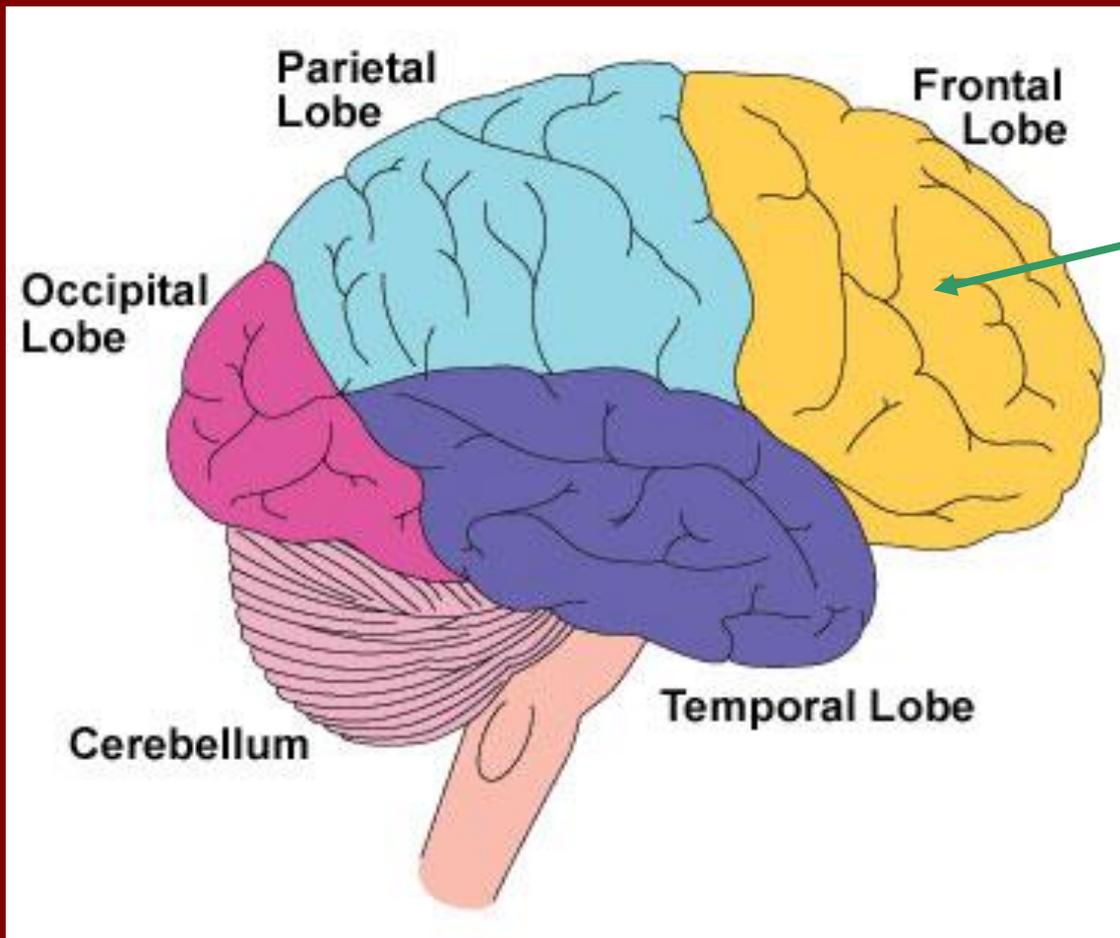


Greater than 2 years' delay
0 to 2 years delay

NS: ADHD=223; Controls = 223

From Shaw, P. et al. (2007). ADHD is characterized by a delay in cortical maturation. Proceedings of the National Academy of Sciences, 104, 19649-19654.

“The Prefrontal Cortex is the Goldilocks of the brain.”



Prefrontal Cortex

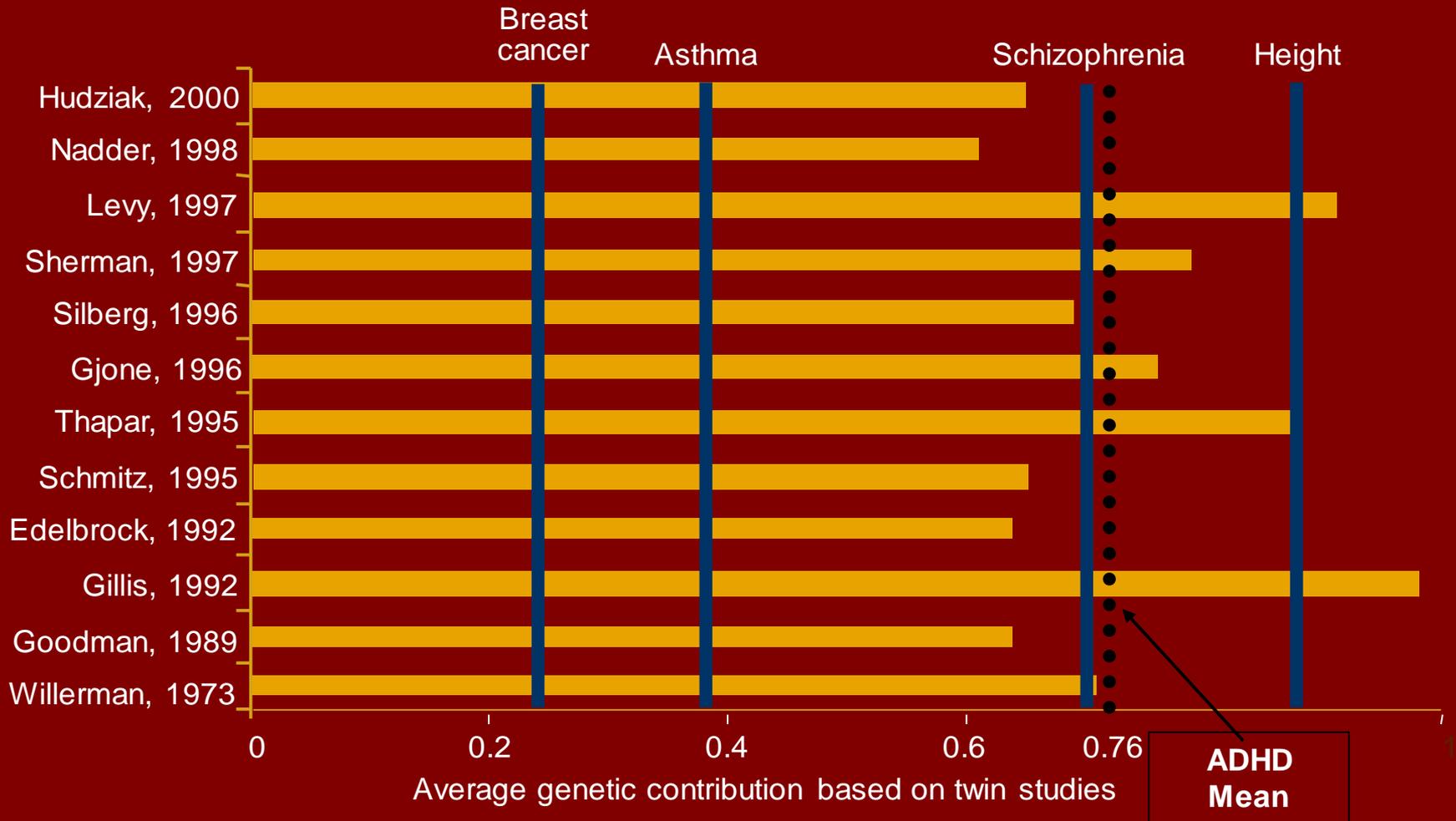
Executive Functioning:

- Planning
- Prioritizing
- Decision making
- Memory
- Organization

Cognitive loading in adults

Dopamine and norepinephrine levels have to be optimal

Heritability Co-efficient of ADHD



Faraone SV. J Am Acad Child Adolesc Psychiatry. 2000 Nov;39(11):1455-7.

Hemminki K, Mutanen P. Mutat Res. 2001 Jan;473(1):11-21; Palmer LJ *et al.* Eur Respir J. 2001 Apr;17(4):696-702.

Tobacco and ADHD

- Maternal smoking contributes to premature birth, low birth weight and ADHD
- Smoking is considered a pediatric disease
- High rates of nicotine use in ADHD (40-75% vs 20% in general population)
- Cigarette smoking is a gateway to drug and alcohol abuse
- Tobacco use is leading preventable cause of death world-wide
- Chronic disease management model is effective for treating tobacco dependence and deserves priority like diabetes and hypertension

Hammerness et al., The Journal of Pediatrics, 2012
Rigottia, N.A., JAMA, October 2012

ADHD Clinical Presentation

School Age (ages 6-12)

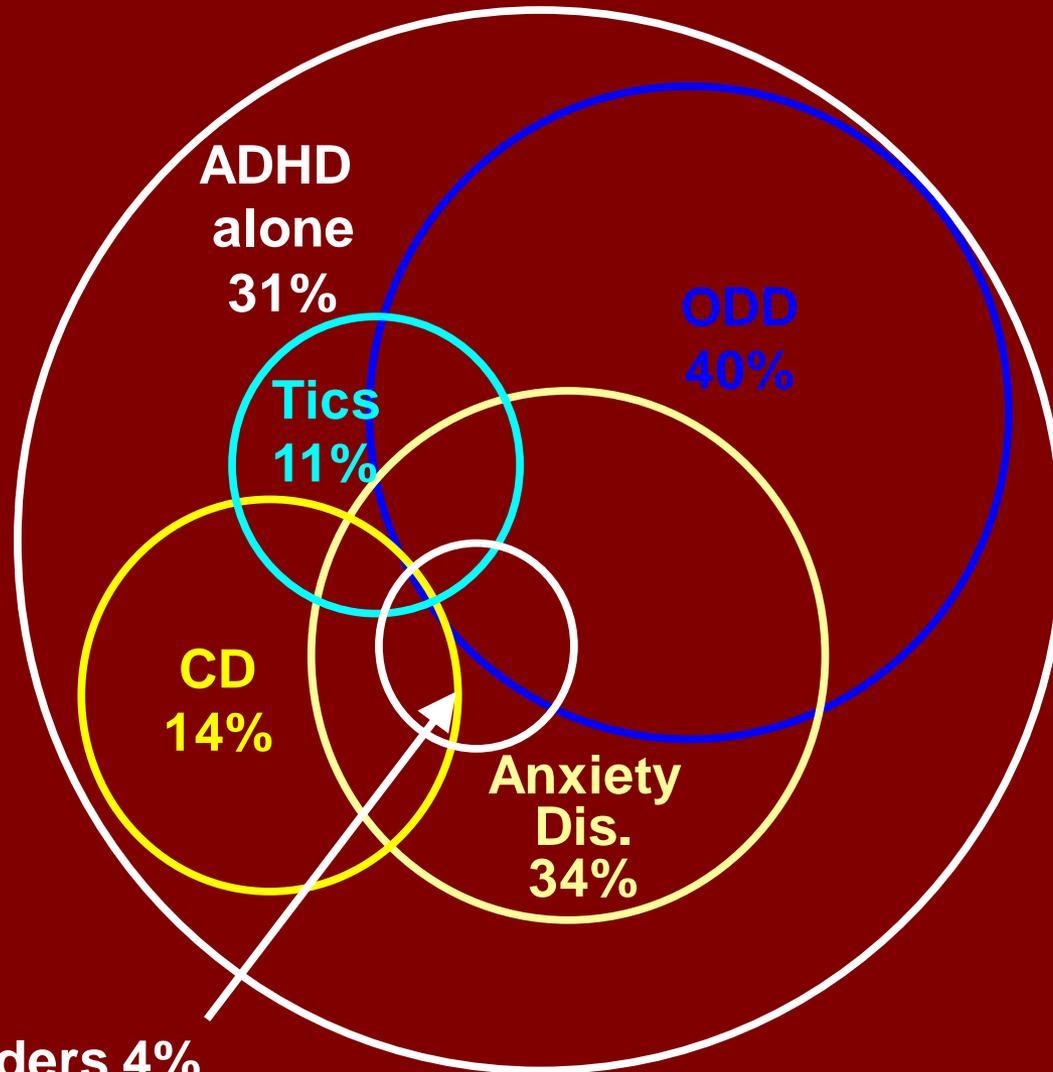
- Easily distracted
- Homework poorly organized, contains careless errors, often not completed
- Blurts out answers before question completed (often disruptive in class)
- Often interrupts others and displays aggression (difficulties in peer relationships)
- Perception of “immaturity” (unwilling or unable to complete chores at home)

Greenhill. J Clin Psychiatry 1998;59(S7):3141
Conners & Jett. 1999 in press

Impairments of ADHD: Cognitive

- Learning disabilities: reading (8-39%), spelling (12-26%), math (12-33%) and handwriting (common 60%+)
- Poor use of time in daily time management; inaccurate time reproduction
- Decreased verbal working memory
- Impaired planning ability

Co-occurring Disorders in Children



Mood Disorders 4%

(n=579)

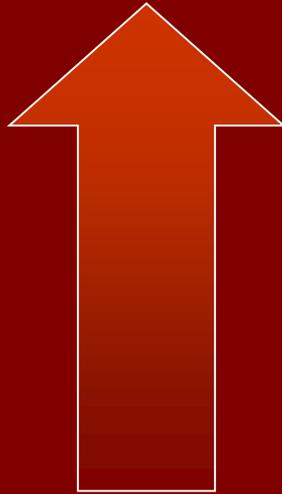
Impairments of ADHD: Emotion

- Poor self-regulation of emotion; greater emotional expression, especially anger and aggression
- Greater problems coping with frustration

* Skin and sound sensitivity

ADHD

Impact on Family



- Divorce
- Marital discord
- Marital dissatisfaction
- Parenting difficulties

Murphy and Barkley. Am J Orthopsychiatry 1996;66:93.

ADHD Clinical Presentation

Adolescent (ages 13-18)

- Sense of inner restlessness
- School work disorganized and shows poor follow-through; fails to work independently
- Engaging in “risky” behaviours (speeding and driving mishaps)
- Poor self-esteem
- Poor peer relationships
- Difficulty with authority figures

Greenhill. J Clin Psychiatry 1998;59(S7):3141
Conners & Jett. 1999 in press

Educational Difficulties for Adolescents with ADHD

- Failure to complete and turn in homework (sustained attention)
- Superficial quality of homework (careless errors)
- Poor test performance (rushes through work)
- Inadequate study habits (sustained attention)
- Disorganization, forgetfulness and memory problems (inattention)
- Inconsistent listening and poor note-taking during classes (inattention)
- Difficulty writing essays and papers (written language)

Pink = DSM-5 criteria

National Factors Contributing to Youth Drug Use and Abuse

- Academic failure beginning in late elementary school, lack of commitment to school, low bonding with other students and teachers

Canadian Centre on Substance Abuse. (2007). Substance Abuse in Canada: Youth in Focus. Ottawa, ON.

Adolescent Driving and ADHD

Teenage drivers with ADHD are:

- 8 times more likely to lose their license
- 4 times more likely to be involved in a collision
- 3 times more likely to sustain a serious injury
- 2 to 4 times more likely to receive a moving violation

ADHD and Sexual Impulsivity

Females:

- 7 times more likely to become pregnant¹
- 4 times more likely to have Sexually Transmitted Disease¹

Males:

- 3 times more likely to have casual sex with infrequent condom use²
- 5 times more likely to have caused pregnancy²

¹Barkley et al., 2008

²Flory et al., 2006

Comorbidity of ADHD and Other Psychiatric Disorders in Adolescents

Psychiatric disorder	% ADHD with comorbidity	% other disorder having ADHD
CD/ODD	35-50% ^(a)	30% ^(b)
Anxiety disorders	20-30% ^(c)	6-24% ^(d)
Mood disorders	20-30% ^(d)	39% ^(e)
SUD	5-50% ^(f)	23-31% ^(g)
Learning disorders	20-25% ^(h)	20% ⁽ⁱ⁾
Tic disorders	10% ^(j)	25-80% ^(k)

(a) Estimated based on prevalence in children (Green et al. 1999) and adults (Weiss et al. 1985; Mannuzza et al. 1993, 1998); (b) Szatmari et al. 1989; (c) Anderson et al. 1987; Bowen et al. 1990; McGee et al. 1990; McGee et al. 1992; Green et al. 1999; (d) Based on data in children (eg. AAP, 1998) and evidence for similar prevalence in adults (Biederman et al, 1993); (e) Biederman et al. 1995; (f) Mendelson et al. 1971; Blouin et al. 1978; Gittelman et al. 1985; Hechtman & Weiss 1986; Barkley et al. 1990; Mannuzza et al. 1993; (g) Demilio 1989; Milin et al. 1991; Hovens et al. 1994; (h) Semrud-Clikeman et al. 1992; (i) Shaywitz et al. 1992; (j) MTA 1999a, 1999b; Wilens, 2000; (k) Comings and Comings, 1984; Shapiro, Shapiro & Young et al. 1988.

Adult ADHD



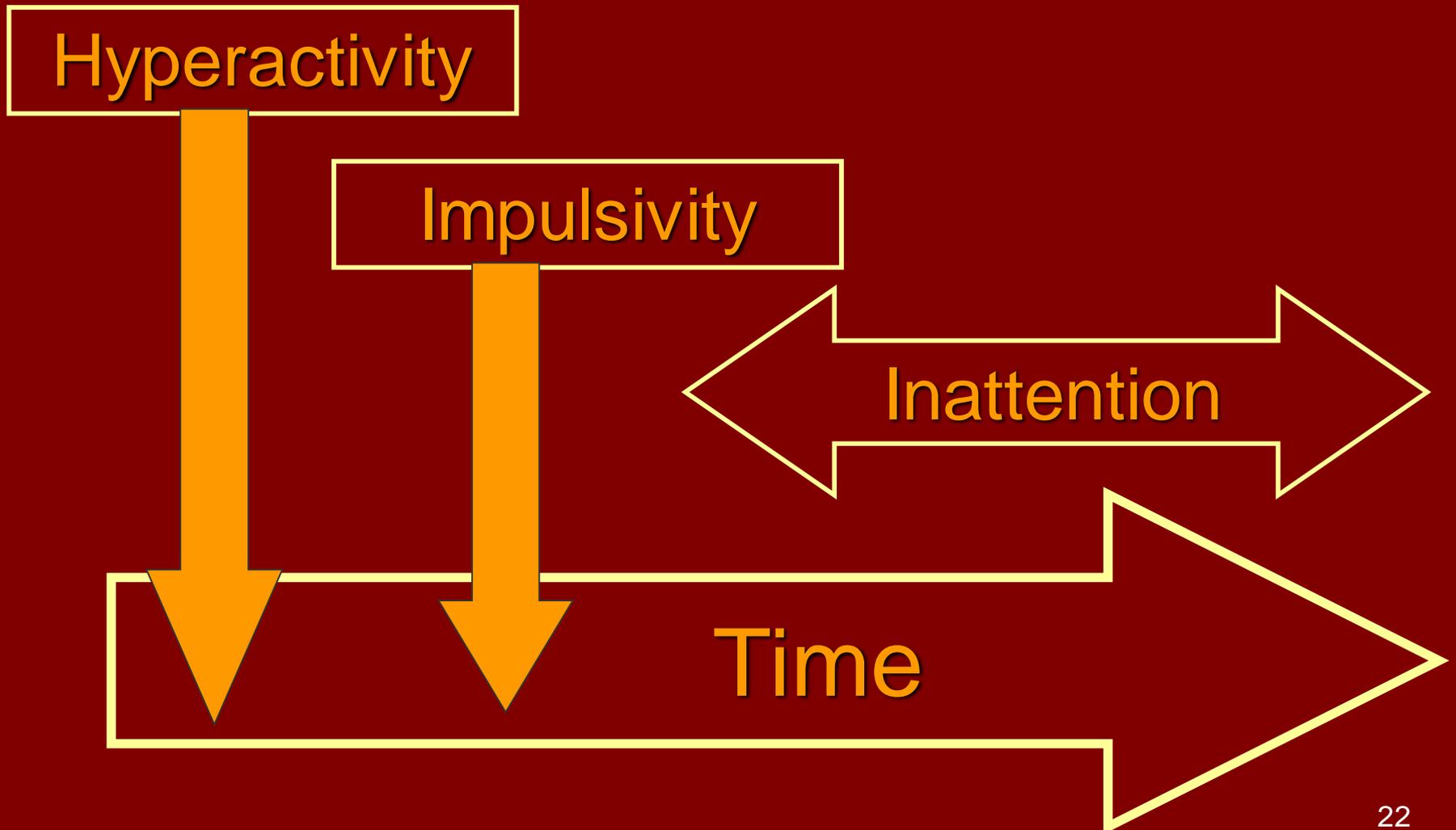
Throughout my life, it has been very difficult for me to sit down and read a book or concentrate during normal conversation. I was even thrown out of school for acting on my impulse and as a result did not continue my education.

My advice to anybody who thinks that they have ADHD is to have their doctor find a specialist and go for help. Medication is not the end all and be all, but it can help. So can coaching and or a therapy.

Howie Mandel

Forward to FAST MINDS – How to Thrive if You Have ADHD (Or Think You Might)

ADHD: Course of the Disorder



Clinical Misperceptions About Adult ADHD

- ADHD in adults is a rare condition
 - Fact: ADHD prevalence is more than Bipolar Disorder and Schizophrenia taken together
 - Prevalence of 4.4%¹
- Adult ADHD is over-diagnosed
 - Fact: Only 1 in 10 adults are ever diagnosed²
- Adult ADHD is not a financially disabling condition
 - Fact: Academic failure, job loss, impulsive spending, financial mismanagement contribute to individual economic burden and lower socioeconomic status
- Adult ADHD does not contribute to global economic burden
 - Fact: Lost work performance contributes to 120 million lost work days and \$19 billion lost³

Bilkey 2013

¹ Kessler et al., American Journal of Psychiatry, 2006

² Adler, Primary Psychiatry, 2009

³ Kessler et al., Journal of Occupational and Environmental Medicine, 2005

Clinical Misperceptions About Adult ADHD

- If you weren't diagnosed as a child, it is unlikely you have Adult ADHD
 - Fact: 75% of patients are not diagnosed until adulthood¹
- Childhood onset for Adult ADHD is difficult to establish
 - Fact: Collateral history with family members, partners, in addition to school records and patient's memory validates childhood onset²
- Adult ADHD is not an important condition to treat
 - Fact: Treating ADHD in the prison population reduces criminality between 30 and 40%³
- Adults with ADHD and very high IQs don't need treatment
 - Fact: High IQ adults with untreated ADHD are just as impaired as adults with average IQ who are untreated for ADHD⁴

¹ Kessler et al., American Journal of Psychiatry, 2006

² CADDRA Guidelines

³ Lichenstein et al., New England Journal of Medicine, 2012

⁴ Antshel et al., Psychological Medicine, 2009

Clinical Misperceptions About Adult ADHD

- Childhood treatment for ADHD with psychostimulants increases risk for later substance use disorder
 - Fact: Large meta-analysis indicates stimulant treatment does not increase risk for development of substance use disorder¹
- Adults with ADHD can't benefit from medication
 - Fact: ADHD is very drug responsive, no matter how long you have lived with it
- In comorbid presentations, treating the mood disorder, anxiety disorder, addictions etc. is more important than treating core ADHD symptoms
 - Fact: Treating lifelong ADHD symptoms restores functionality and self-esteem
- In Adult ADHD, men are mostly affected
 - Fact: ADHD is an equal opportunity condition, affecting many women

Clinical Misperceptions About Adult ADHD

- Sheer will can overcome Adult ADHD symptoms
 - Fact: Compensatory burden occurs with massive effort and energy that adults must employ to function at all
- Adults have lived with ADHD all their life, why treat now?
 - Fact: The cognitive demands of an adult life are much more complex than that of a child or a teen
- ADHD goes away in adolescence
 - Fact: ADHD is a highly persistent neurobiological condition; where is it supposed to go?
- Why do adults question possible ADHD for themselves?
 - Fact: The diagnosis is an explanation for unfulfilled potential and lowered self-esteem. They can stop blaming themselves and blame the ADHD instead

FAST MINDS

F – Forgetful

A – Achieving below potential

S – Stuck in a rut

T – Time challenged

M – Motivationally challenged

I – Impulsive

N – Novelty seeking

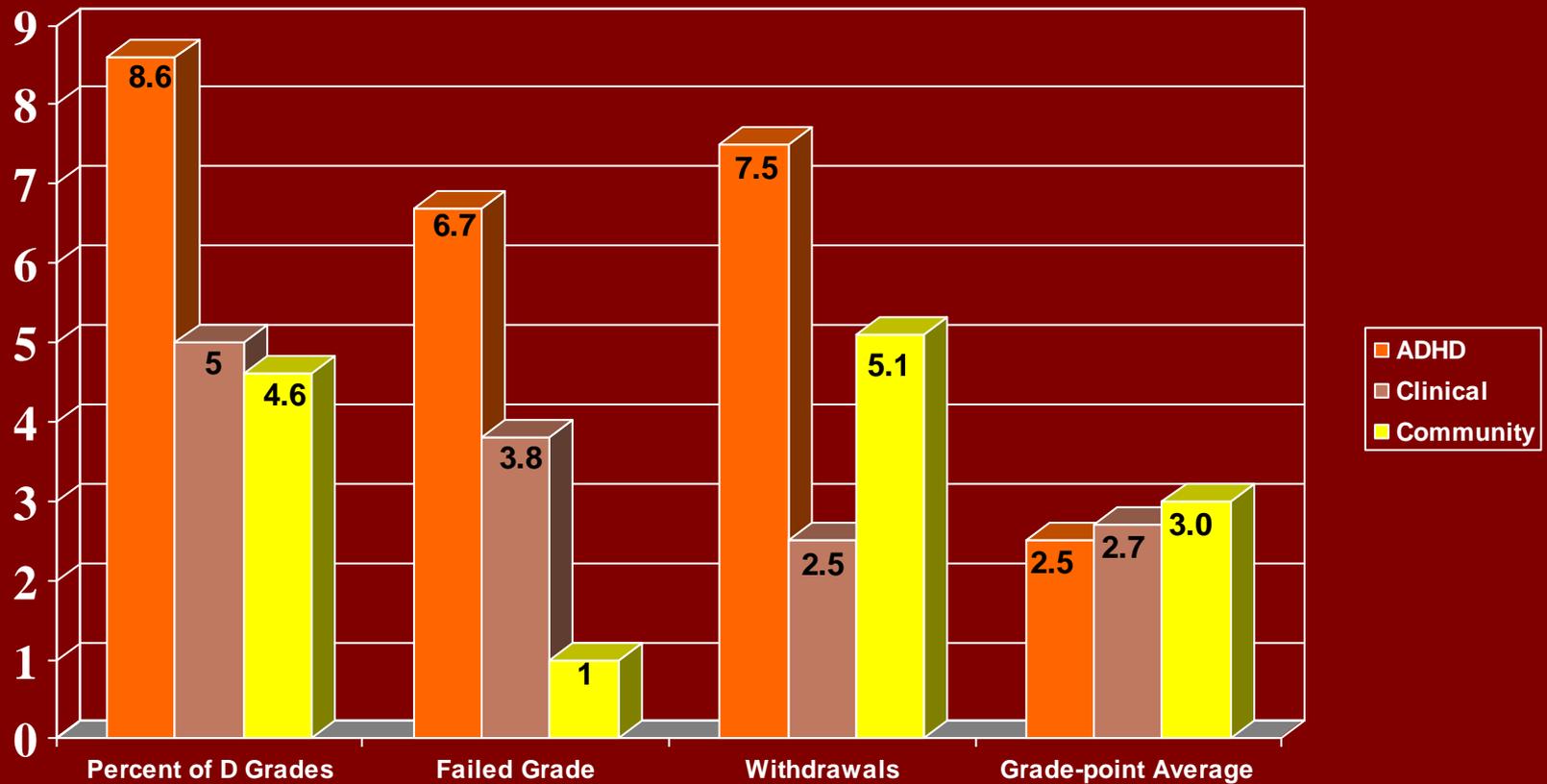
D – Distractible

S – Scattered

Impulsivity in Adult ADHD

- Impulsive physical activities – risk taking (**Winstanley et al., 2006**)
- Impulsive decision making (**van Gaalen et al, 2006**)
- Verbal impulsivity (**DSM-5**)
- Impulsive driving (**Fischer et al., 2007**)
- Impulsive spending (**Barkley 2008**)
- Impulsive binge eating (**Obesity, Levy et al., 2009; Bulimia Nervosa, Mikami et al., 2009**)
- Bingeing on alcohol (**Ohlmeier et al., 2008**)
- Bingeing on drugs (**Arias et al., 2008**)
- Sexual impulsivity (**Flory et al., 2006**)
- Impulsive gambling (**Breyer et al., 2009**)
- Impulsive stealing (**Barkley et al, 2008**)
- Impulsive fighting (**Barkley et al, 2008**)

Educational Functioning by Group for UMASS Study: College Transcript



Female Sexual Victimization and ADHD

- N=374 female college students
- ADHD symptoms increase likelihood of engaging in risky sexual behaviour
- ADHD symptoms “uniquely increase the risk of sexual victimization”

Effects of Adult ADHD on Performance of Workers: Results from WHO World Mental Health Survey Initiative

- ADHD assessed 7075 workers in 10 countries: Mexico, Belgium, Columbia, France, Germany, Italy, Lebanon, Netherlands, Spain, USA
- 3.5% of workers met criteria for ADHD
- Workers with ADHD have 22 days excess lost role performance
- Estimated 143.8 million lost days of productivity associated with ADHD in these countries
- In Mexico alone, 2.9 million annual lost days of productivity
- Minority of workers were treated for ADHD
- None of the workers in Mexico were receiving treatment

Occupational Issues of Adults With ADHD

- Consensus committee from United Kingdom, mainland Europe and United Arab Emirates met to produce statement effect of ADHD on employment
- Those with ADHD are impaired in all aspects related to employment: job searching, interview process, employment itself
- Those with ADHD may begin employment as highly motivated workers, but ADHD symptoms can soon hamper performance
- Employees have difficulties with time management, organizing schedules, keeping on top of work load, following instructions, procrastination
- Most employers do not recognize implications of ADHD

Impact Of Untreated ADHD In The Workplace: What Adults Say

- 60% felt ADHD impacted on job performance
- 70% felt it took them too long to get things done
- 75% by the time they reached home were often too tired to manage family and parenting responsibilities
- 40% worried they might lose their job due to ADHD

Comorbid ADHD/SUD Linked to Worse Outcomes Than SUD Alone

- More severe course of SUD
- Earlier onset of substance abuse
- Lower remission rates
- More substance dependence
- Elevated risk of transition from drug abuse to drug dependence
- “The prevalence, burden, and severity of comorbid ADHD-SUD are significant and highlight the importance of effectively managing the condition”

Driving With ADHD

- 8 times more likely to lose license¹
- 4 times more likely to be involved in a collision¹
- 3 times more likely to sustain a serious injury¹
- No significant differences for gender in driving variables (braking, speed control, steering) between male and female adolescents with ADHD (age 16-19)²
- **Untreated ADHD drivers have same deficits operating a motor vehicle as non-ADHD intoxicated drivers³**

¹ Cox 2007

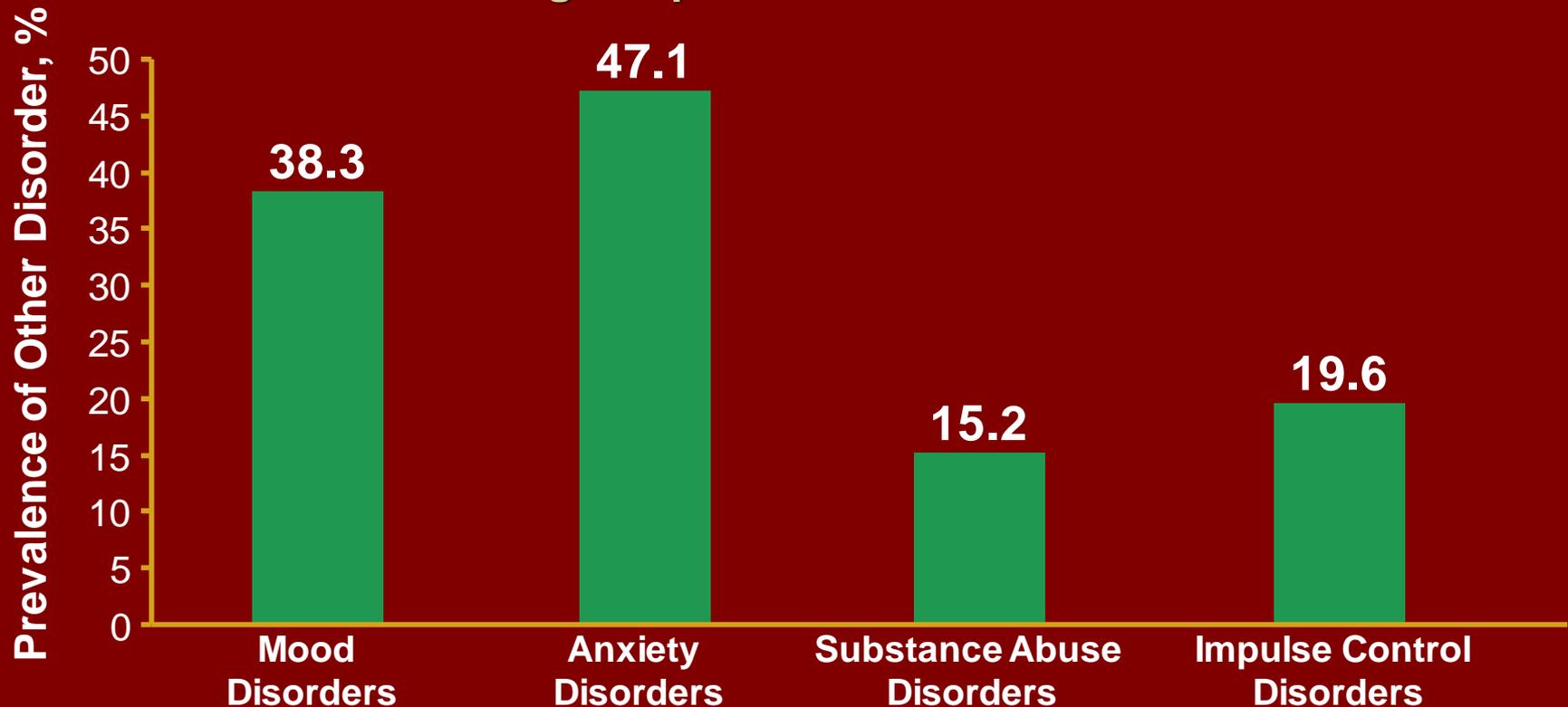
² Mikami et al., 2009

³ Weafer et al., 2008

Comorbidity of Other DSM-5 Conditions with ADHD

National Comorbidity Survey Replication (N=3199)

Among Respondents with ADHD



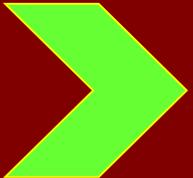
Among respondents with ADHD, reported comorbid disorder within the previous 12 months.

Steps to the Clinical Diagnosis of Adult ADHD

Is there history of medical complications in pregnancy (maternal smoking, alcohol consumption, low birth weight, etc.)?

Was the patient adopted? Is there a family history for ADHD (80% genetic)?

Is there evidence for childhood onset of impairing symptoms of hyperactivity, impulsivity and distractibility (early school records document comments such as “poor attention span, does not apply himself, could do better...”)?

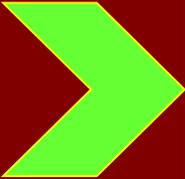


Is there longitudinal persistence of symptoms into adolescence and adulthood (underachievement in high school, family dysfunction, etc.)?



Steps to the Clinical Diagnosis of Adult ADHD

Does the patient cross-sectionally endorse symptoms of Adult ADHD (adult rating scales, e.g., ASRS)?



As a consequence of the ADHD symptoms, do they demonstrate impairments in multiple domains (occupational, educational, social, family, driving a motor vehicle, etc.)

Confirm or disconfirm other psychiatric disorders (rating scales and mental status examination).

Rule out underlying medical disorder (e.g., seizure disorder, traumatic brain injury, sleep disorder)

ASRS Screener v1.1

1. Inattention	Never	Rarely	Somet imes	Often	Very Often
How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?	0	1	2*	3*	4*
How often do you have difficulty getting things in order when you have to do a task that requires organization?	0	1	2*	3*	4*
When you have a task that requires a lot of thought, how often do you avoid or delay getting started?	0	1	2	3*	4*
How often do you have problems remembering appointments or obligations?	0	1	2*	3*	4*
1. Hyperactivity/Impulsivity					
How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?	0	1	2	3*	4*
How often do you feel overly active and compelled to do things, like you were driven by a motor?	0	1	2	3*	4*

Significant items in Orange (*p=0.5); Likely to have ADHD with ≥ 4 significant items

ADHD in Adults: Differential Diagnosis

Consider:

- Cognitive deficits secondary to anxiety disorders, mood disorders and psychosis
- Substance Use Disorder
- Cognitive disorders (intellectual functioning and learning disabilities)
- Sensory impairment
- Psychosocial development/stressors
- Neurological disorder/iatrogenic

Why Treat?

- ADHD by definition is an impairing condition which can potentially lower life expectancy
- Cigarette smoking/obesity (New England Journal of Medicine, 2009)
- Motor vehicle accidents
- Reduces criminality
- Increased risk for STDs (HIV)
- Increased adherence rates for treatment of psychiatric comorbidities (e.g. Bipolar Disorder, addictions)
- Increased adherence rates for treatment of other medical conditions (e.g. diabetes, HIV, chronic viral hepatitis) – General Hospital Psychiatry, 2008
- Increased adherence rates for other prescribed medications (e.g. birth control, asthma medication, etc.)

Castaneda R et al., "Treating adult attention deficit hyperactivity disorder in hospitalized psychiatric patients", *General Hospital Psychiatry*, 2008

Russell A. Barkley, Kevin R. Murphy, Mariellen Fischer, *ADHD in Adults: What the Science Says*, 2008

R. Barkley, *Handbook for Diagnosis and Treatment of ADHD*, Third Edition, 2006
(APA, DSM-5, 2013)

Lechenstein et al., *New England Journal of Medicine*, 2013

Bilkey, 2012

ADHD Medications Available in the U.K.

- Atomoxetine (Strattera) - only medication with adult indication in Europe
- Lisdexamfetamine dimesylate (Elvanse)
- Methylphenidate IR (Ritalin, Medikinet)
- Methylphenidate modified release (Equesym XL, Medikinet XL)
- OROS Methylphenidate (Concerta)

Extended Release Formulations Preferred for Children, Adolescents and Adults With ADHD

- Stigma of taking medication during the day avoided¹
- Improved adherence²
- Longer duration of effects²
- Some research shows higher rates of remission³
- Methylphenidate is approximately 50% potency of amphetamine

1 Hosenbocus, Chahal, Can Acad of Child, Adolescent Psych, 2009

2 CADDRA, 2011

3 Steele et al., Can J Clin Pharmacology, 2006

Treatment Side Effects

Stimulants

- Dry mouth, appetite reduction, GI upset, insomnia, blood pressure elevation, dysphoria/irritability (may emerge after a few weeks), obsessiveness, tics, headaches

Non Stimulants (Atomoxetine)

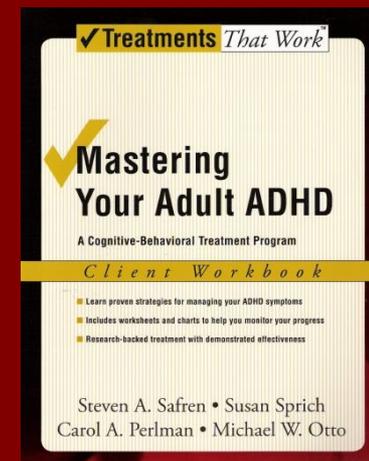
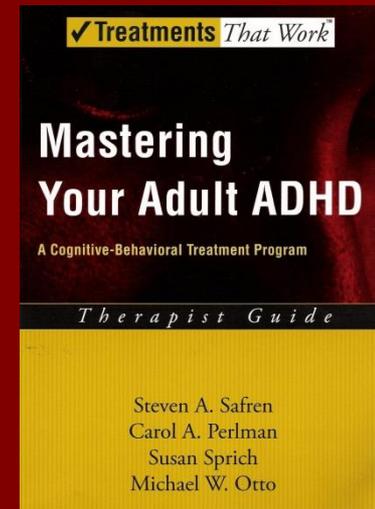
- Similar to stimulants except a higher incidence of GI upset, sedation and sexual dysfunction
- Divided/QHS dosing may help

ADHD Medications Not Linked to Increased Cardiovascular Risks in Adults

- Study of 443,198 young and middle-aged adults
- N=150,359 ADHD medication users
- Study concluded that ADHD medication use, “was not associated with an increased risk of serious cardiovascular events.”

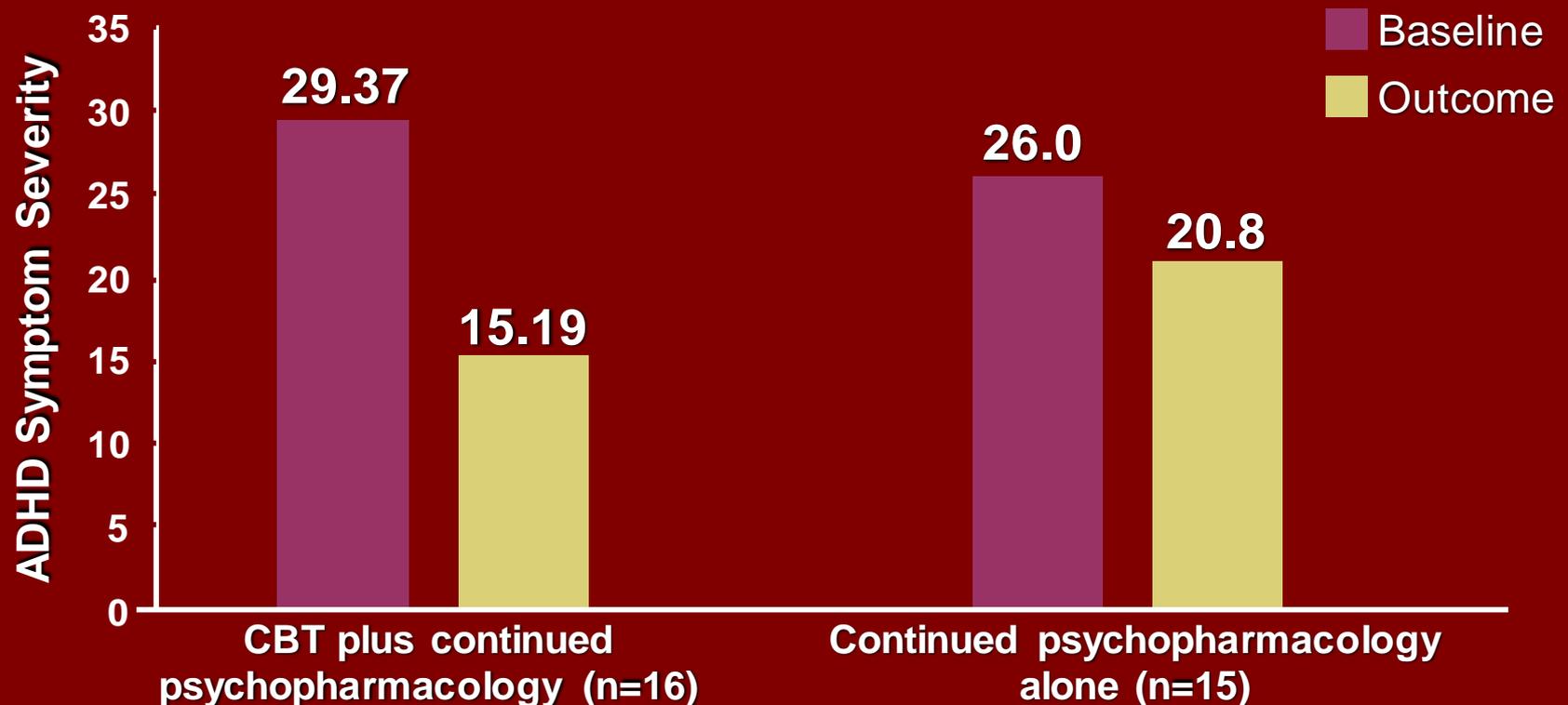
CBT for Adolescent ADHD

- N=68 adolescents, mean age 16.4 years, treated with medication
- Completed a version of Steve Safren's CBT program; 13-16 sessions
- Improvements noted in inattentive symptoms, pharmacotherapy adherence, school attendance, school tardiness, relationships and self-esteem
- Lower doses of medication needed to maintain functional improvement



Efficacy of CBT for ADHD in Medication-treated Adults

Independent Evaluator Measures of ADHD Symptom Severity



$p < 0.01$

What Else Works

✓	Areas for Extra Help	Resources to Assist You
	Your understanding of how FAST MINDS or ADHD impacts your life	Psychiatrist; psychotherapist; coach who specializes in ADHD; group for ADHD or organization
	Building mindfulness skills to be less governed by internal distractions	Mind-body work – Lidia Zylowska, <u>The Mindfulness Prescription for Adult ADHD</u>
	Practice decreasing negative self-talk, attitudes that get in the way of clear, engaged function	Mental health clinicians; CBT; dialectical behavioral therapy; self-help mental health workbooks
	Breaking tasks down into steps you can vividly hold in your mind	Organizational, job, or ADHD-specific coach; mentor; well-organized friend/family member; CBT
	Creating a low-distraction (actual and virtual) workspace at home, work, and school	Organizational or ADHD-specific coach; well-organized friend; employee assistance/human resources department; university/college student services department
	Making use of to-do lists and planners a routine	Self-help organizational books; organizational coach; well-organized friend/family member; rehabilitation specialist; phone apps

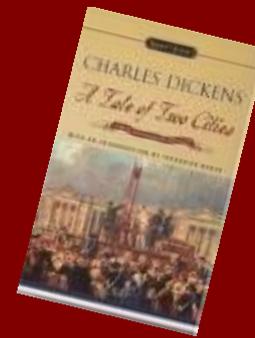
What Else Works

✓	Areas for Extra Help	Resources to Assist You
	Getting ideas for high-yield behavior patterns, systems and habits	ADHD coach; support group; mentor; close friend/family member; students services department; rehabilitation specialist
	Training in using peripheral devices such as phones, computers, tablets	Classes by device companies; online tutorials; workplace, community college classes
	Eliminating things in your life that you don't do well or engage in naturally	Career counsellor; ADHD coach; close friend/family member; aptitude and vocational counselling; financial advisor
	Chances to see other people apply useful habits	Mentor, close friend/family member; support groups
	Practice habits and systems with people	Close friend/family member; work colleagues; rehabilitation specialist; tutor
	Determining critical moments when you can make better choices	Close friend/family member; ADHD coach; support group; psychotherapist

What Else Works

✓	Areas for Extra Help	Resources to Assist You
	Adapting and choosing work, home, and social environments that match you best	Career counsellor; ADHD coach; support group; aptitude and vocational assessment; close friend/family member
	Keeping health daily rhythms	Personal trainer; support group; close friend/family member; mindfulness
	Practicing social skills	Coach; Toastmasters group; close friend/family member; mindfulness
	Creating accommodations at work or school	Human resources department; school disability office; ADHD coach; close friend/family member
	Measuring progress by tracking challenges and being held accountable	Close friend/family member; ADHD coach; online tools
	Choosing educational, career, social, or other opportunities that can make up a more fulfilling life	Career counsellor; aptitude and vocational assessment; mentor; shadow close friends and family
	Managing finances	Accountant/bookkeeper; credit/debt counselling

ADHD: A Tale of Two Cities



Untreated

Treated

Academic underachievement	→	Academic success
Occupational underachievement	→	Improved job proficiency
Poor driving outcomes	→	Reduced driving risks
Poor social skills	→	More dialled in socially
Impulsive risk-taking	→	Reduced impulsivity (spending, sexual, etc.)
Distractible	→	Improved concentration
Low self-esteem	→	Self-actualization
Demoralized, overwhelmed	→	Improved quality of life

Online Resources

- mhra.gov.uk (Medicines and Healthcare products Regulatory Agency) – Learn about medications used to treat ADHD in the UK
- [CHADD](#) (Children and Adults with Attention-Deficit Hyperactivity Disorder) – Excellent source of information about ADHD across the lifespan
- [CADDRA](#) (Canadian ADHD Resource Alliance) – Information for doctors, parents, patients and educators
- flylady.net – Organizational strategies for those with ADHD

"[An] easy-to-read, yet sophisticated guide to what will help you most if you have ADHD... A superb book."—EDWARD HALLOWELL, coauthor of *Driven to Distraction*

FAST MINDS

**How to Thrive If
You Have ADHD**
(Or Think You Might)

Craig Surman, M.D.
Tim Bilkey, M.D.
with Karen Weintraub

[An] easy-to-read yet sophisticated guide to what will help you most if you have ADHD... A superb book."

Edward Hallowell
Co-author of *Driven to Distraction*

"A fascinating and refreshing perspective on ADHD...an excellent set of recommendations for how people with adult ADHD can manage their difficulties and lead more successful, fulfilling lives."

Russell A. Barkley, Ph.D., author of *Taking Charge of Adult ADHD*

"One of the most innovative, comprehensive, and useful guides to the world of the ADHD adult."

Mark Stein, Ph.D., ABPP professor of psychiatry and director of Life-Span ADHD program, University of Illinois at Chicago

"This is an excellent resource which will be of great help to adults struggling with ADHD. It is one of the most comprehensive books on the subject that I have seen."

Dr. Mary Solanto, Associate Professor - Director, ADHD Centre, Department of Psychiatry, Mount Sinai Medical Centre, New York